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ABSTRACT

Educational indicators are statistical input/output measures providing information on the health of the educational system. This report for the consideration of the Council of Chief State School Officers characterizes the current state of educational indicators as in "shambles." It proposes a three phase framework for developing a sensitive and responsible set of national educational indicators. To resolve the conflicting forces of centralization for accountability versus local and state control to meet the needs of diverse populations, it recommends: (1) that each state develop, maintain, and make publicly available local educational indicators; and (2) that two types of "national" indicators be developed-- one to augment the common core of state data, and the other, collected at a regional or national level, to meet federal government monitoring needs. Implementing these recommendations will take several years, plus the commitment of both state and federal governments. Phase I of the implementation process proposes interim steps for 1985, including modifications for the federal "wall chart" of educational quality. Criteria for selecting indicators and strategy suggestions for specifying a model in terms of five outcome indicators and various input indicators for school characteristics, school processes, and policy and environmental indicators are given for Phase II. Phase III involves steps necessary to maintain and improve the established indicators. (BS)

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A Framework for the Development of National Educational Indicators

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For the Consideration of the Council of Chief State School Officers

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Educational Indicators

Overview: This report proposes an approach to the development of a sensitive and responsible set of national educational indicators. The first part of the report sets out the reasoning for establishing indicators, evaluates the quality of existing educational indicators and considers whether states should be directly compared on measures of educational quality. This part concludes with a set of recommendations for the states and the Federal government. The remainder of the report describes a three-stage process. The first phase would be the improvement and updating by the Federal government of the 1984 Secretary's "wall chart" for release in 1985. The second phase would be the specification and development of a set of indicators which would serve as the bases for national reports in 1986 and beyond. The third phase would involve approaches to improving the usefulness and breadth of the indicators including the incorporation of systematic ways of carrying out international comparisons and of monitoring the quality of the indicator data.

I. Introduction

A. What are Educational Indicators?

The fundamental purpose of a statistical indicator is to provide information about the state of health of a system—the educational system in this instance. A statistic becomes an indicator when it is useful in a policy context. For example, it is not particularly useful to know there are 2.5 million teachers in the U.S. or that there are 45 million students. These numbers describe the size of the system rather than its health.

It would be more useful to put these numbers together to form a pupil/staff ratio--in this instance about 19:1. This statistic would qualify as an indicator when two conditions are met.

1). The statistic should measure something which relates to the health of the educational system. To make things simple we can divide indicators into two categories—inputs and outcomes. Thus, like an index of smoking (input) which relates to human longevity (outcome), the pupil/staff indicator (input) should be demonstrably related to an agreed upon outcome of schooling such as academic achievement. The selection of outcomes is critical, for they are used as a test of whether an input statistic qualifies as an indicator. A mature set of indicators should each bear an understandable relationship to the health of the system and to each other such that together they can be viewed as a model of the system. Finally, as in the development of any model, one goal should be parsimony, that is, the fewer the indicators the better so long as the health of the system is adequately assessed.

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2). An indicator such as pupil/staff ratio that assesses some component of the health of a system doesn't have any policy meaning until it is placed into a particular context. There are four basic ways of doing this.

a). An indicator can be contrasted with a "standard" or "criterion level." Thus, if we happen to know that educational achievement is particularly enhanced in the type of system being monitored if the pupil/staff ratio goes below 16:1, then a ratio of 19:1 could indicate to us that the health of the system could be improved by lowering the pupil/staff ratio.

b). An indicator can be contrasted with itself over time. It then takes on meaning through a combination of its relationship to the health of the system and its own direction of change: a decrease in the pupil/staff ratio from 19:1 to 18:1 may indicate an increase in the health of the system. The validity of this inference will rest in part on the degree to which other parts of the system have changed over the time period.

c). An indicator assessed in two different places (systems) at the same time can be contrasted with itself. States or countries, for example, might be contrasted on the pupil/staff ratio indicator. This is a more difficult comparison for developing valid information for it requires a detailed understanding of the overall differences between the two systems. Contrasting the Japanese and U.S. systems of education on an indicator such as pupil/staff ratio makes little sense unless we know a great deal more about differences between curricula, teacher training, etc.

d). A fourth way of obtaining meaning from an indicator is to contrast it to another indicator. This may seem odd at first, for how could we contrast pupil/staff ratio with a measure of curriculum quality? The trick is to use the relationship of each to the health of the system and then to calculate the utility of changes in each indicator in a common metric such as dollars. This particular approach is known as cost-effectiveness analysis. The comparison would then be something of the following sort: a reduction in the national pupil/staff ratio by one unit would cost $xx and would increase achievement by yy% while an increase of equal cost in amount of in-service training would raise achievement by zz%. This mode of comparison assumes a strong causal model of the educational process to drive the selection of indicators.

B. Why worry now about a set of national educational indicators and how would we use them if we had them?

Since the birth of the Office of Education in 1867, the collection and dissemination of national statistics on education has been a federal priority. A three foot stack of reports containing thousands of

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statistics is produced yearly by the Department of Education. What's the problem? There are two reasons for concern now:

1). The present state of educational indicators is a shambles. Consider outcomes for a moment. The only national measure of educational achievement (NAEP) has been on an erratic schedule over the past 10 years, contains admittedly weak measures of higher order skills, and results cannot be broken down at a level below regions of the nation. The figures for the retention power of our elementary/secondary system are even worse. The U.S. Census reports that 17% of 18-21 year olds are not enrolled in school and failed to finish high school. NCES places the dropout rate at around 27% nationally. These inconsistencies make both sets of data practically useless for informing policy matters. At the sub-national level the quality of our statistics for dropouts is even worse. Input indicators are little better. The nation has no way of keeping track of the quality of its teachers, of the material covered in its textbooks and only sporadically assesses even the titles of courses taken by students. For the reason of adequacy of indicators alone, attention should be paid now to the quality of the monitoring system.

2). The second reason for present concern has to do with the conjunction of three societal trends: a tremendous increase in our capacity to gather, store and process statistical information; an increased concern in the nation to hold institutions of government accountable for their outcomes; and a perceived need for improvement (albeit based on inadequate data) in the quality of the educational system which has led to a multitude of attempts to alter the system to improve its productivity and efficiency. Improved indicators could help us to:

a). Monitor changes across time in inputs and outcomes to alert us to potential problems.

b). Assess the impact of educational reform efforts using changes in policy at the LEA and SEA levels as naturally occurring experiments.

c) Encourage and prod the educational system or parts of the system to do better by contrasting the U.S. system with other nations or parts of the U.S. systems (SEAs or LEAs or regions) with each other. Another way of prodding is to contrast the outcomes of the system or parts of the system with a goal or standard of quality (e.g., the nation could establish a goal of a 90% graduation rate).

d). Focus attention on educational sub-systems that may require improvement such as the vocational education or handicapped or bilingual sub-systems.

e). Provide leadership to alter the course of the educational system by changing the outcome variables used as indicators. An

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indicator that assessed higher order cognitive skills, for example, might influence the focus of the curriculum.

C. Should states be compared?

To some this seems like an absurd question, for data have been gathered on a state-by-state basis for years and reported in places such as the Condition of Education where easy state-to-state comparisons can be made. If we are to take seriously, however, the notion that indicators are not just a haphazard set of statistics but a systematic attempt to picture and report the health of a system, then the issue of state-to-state comparisons takes on considerable political and substantive importance. This is particularly true where outcome indicators such as achievement levels and retention rates are concerned.

The recent national "report card" highlighted outcome measures and used state-to-state comparisons and time trends as the mechanisms for giving meaning to a set of indicators. The use of states as a primary contrast has two major problems. The first is that states differ greatly on a whole range of indicators, making it difficult to evaluate differences on any single indicator. To meaningfully compare NY and VTs dropout rates we have to know a whole lot about NY and VT. The second problem is that data for some key indicators is not even gathered in some states (e.g., National Assessment data) and therefore, inadequate measures (e.g., SATs or ACTs) of important outcomes are used in their place. This greatly reduces the validity of the indicators.

On the other hand, we have pointed to three reasons for displaying indicators state by state. The first is to prod them to do better by putting them in a competitive frame-of-mind. The second is to gain data for assessing the many naturally occurring experiments that have the state as the unit of analysis. The third is to enable a state to compare its change to nationwide trends so that it may take steps to improve itself.

The most compelling reason for having state-by-state data, however, is not determined by the purpose of comparisons with other states. The fact that the state has legal responsibility for the quality of education within it coupled with a national desire to hold government accountable for its responsibilities makes state-by-state reporting of indicators practically imperative. But, this argument does not require that states should be compared one to another or even that all states should report the same indicators. Indeed, if states legitimately vary in their goals for education then their sets of indicators might also vary. (One state might emphasize higher-order skills while another emphasizes basic skills—they would use different tests for assessing these different cognitive skills and, because the model of the system is influenced by the choice of outcomes, the input indicators might also be different for the two states.)

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This suggests the possibility that a "national" set of indicators might have the possibly pernicious effect of reducing the control of the state over its educational goals and priorities. And given the admittedly tremendous diversity among states, the set of indicators would either have to be inappropriate for many states or be indicative of a "lowest-common denominator" level of quality. These consequences should be avoided.

The press toward centralization to insure accountability and the opposite force to retain local control to meet the needs of diverse populations are straining the fabric of our educational system more than ever. There is no question about whether the federal government is moving toward a coordinated set of indicators (input, process and outcome indicators) for the nation—many of these indicators will be collected so that there will be state representative data. Moreover, because of the political interest, a powerful argument can be made that the federal government will move to a comprehensive set of indicators gathered on a state by state basis including achievement test outcomes. The comparisons of states on their SAT/ACT results, the contract that the Education Department has let to examine the comparability of existing state tests, and the high level of attention given to achievement outcomes by the press all indicate that the state by state comparisons are here to stay.

One issue, then, is who will determine the groundrules for the comparisons. There appear to be only two alternatives—the federal government or the states collectively. Either group would have to address the issues on a national basis. Either group would have to consider ways of fairly representing data from diverse localities. Either group would have to develop models and criteria for the definition and collection of the data. Either group would have to develop and maintain safeguards to protect states from being pressured into an undesirable conformity with "the way that other states do it," whatever it may be. Although it may not fit with the standard agenda of the CCSSO, it seems to me that the collective state superintendents have a considerable stake in this matter. Indeed, one way of insuring that each state has at least a place at the table where these decisions are reached is to have the CCSSO take the initiative in establishing the conceptual framework and the groundrules for implementation.

D. Recommendations

Regardless of whether the federal government or the CCSSO takes the initiative, this discussion suggests the following set of recommendations:

1). Each state should develop, maintain and make available to the public on a regular basis its own set of indicators for monitoring the state of health of its educational system. The indicators should include measures of inputs and outcomes, including measures of educational achievement. The wide diversity among states is reason for

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Nonetheless there will be indicators which are common to all of the states, as there are now. These indicators, such as per pupil expenditure, class-size, curriculum requirements, retention rates, etc., should be assessed in a common fashion for purposes of comparison and aggregation.

2). For national purposes to monitor issues of national significance and to provide leadership there should be a core set of indicators which are gathered to represent the state of health of the nation's system of education. Two kinds of indicators are called for here.

a). The first set of "national" indicators would be gathered on a state level and would augment the common core of data already collected by the states. The scope and nature of these data would be determined cooperatively by the various states. Together with the common core already collected, they would present as parsimonious and accurate a picture as possible of the condition of education in each state. The data would be gathered on a sample basis within states to reduce cost and burden.

b). The second set of "national" indicators would be designed to meet the particular needs of the federal government. This set of indicators would make it possible for the federal government to monitor federal initiatives and federal responsibilities for the progress of the most needy in the society, for the quality of the nation's manpower pool or for the health of the nation's economy. In almost all instances the data collected for these purposes would be on nationally and regionally representative samples that would not be representative at the state level. Similarly, the reporting of the data would be on a regional and national basis.

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II. Phase I: Interim Steps

In order to implement these basic recommendations, an interim and a long-term strategy needs to be developed. This section spells out the interim strategy. Three assumptions drive this proposal: the first is that there will be a federally announced report of educational quality in 1985 (a new "wall chart"); the second is that the federal government and states are committed to the development of a systematic and responsible approach to monitoring the quality of the educational system; the third assumption is that the development of such an approach will take two or three years and then will require a modest level of yearly attention.

A. The 1985 federal educational indicator "wall chart."

One consequence of these assumptions is that the 1985 report ("wall chart") will come too soon to incorporate the thinking and data necessary for the production of a comprehensive and valid set of indicators. This suggests that an interim product will be required for 1985. We propose that the interim report have the following characteristics:

1). The 1985 report should build on the 1984 report by using essentially the same set of indicators and by reporting change scores from 1984 to 1985 as well as the longer-range trends..

2). Although the essential indicators would be similar, it is important to make a few changes, first to show that the monitoring system can be improved and second, because there are some simple and important changes that can be made to improve the quality of the indicators. These include:

a). Add an estimate by state of the yearly in/out migration as a way of giving more information for evaluation of the reported drop-out rates.

b). Add an estimate by state of the number of people who obtained a GED in the state expressed as a percentage of the number of 18 year olds in the state.

c). Use the ETS formula to combine the SAT and ACT scores on a state-by-state basis and report the percentages of students taking the two tests.

3). The report also should provide a small amount of carefully selected national [and regional] indicators, making sure that each has a very high level of validity. These indicators would be the forerunners of a more complete set.

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B. Other interim steps.

In order to prepare for future years, the following activities should be carried out during calendar year 1985:

1). Activity by the states and the federal government should continue on the development of a core set of indicators that will together serve as the way the nation assesses the health of its educational system. This work has already begun at the Department of Education in conjunction with the CCSSO and a number of other education groups. It should continue at the same pace but on a longer time frame to insure that the work is as complete and thoughtful as possible. Considerable effort will be required to develop a "model" to drive the collection of indicators. The research activities of the Department should be coordinated with the effort so that research syntheses and new research efforts could be carried out in support of the indicator development effort. Congress should be kept informed of the activity and there should be a place within the Department given the authority and resources to continue the work on a steady basis.

2). Work should also begin on the collection of data to form certain indicators. For example, more accurate data on dropouts could be generated. Data collected in 1985 form an important mid-decade data point for comparison with Census data.

3). Coordination between the Department of Education and the Census Bureau should be initiated so that the 1990 census will contain the kinds of questions that are necessary for the indicators and so that the Current Population Surveys (CPS), conducted on samples of Americans periodically in between the 10 year Census, gather data useful for the indicator effort.

4). The federal indicator effort should also work closely with states to insure that individual states define educational indicators appropriate to their needs and to coordinate data collection efforts so that paperwork is minimized.

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III. Phase II: Toward a Mature Set of Educational Indicators

This phase has already begun with the Department's, CCSSO's and other efforts. It should continue over the next two to three years. It involves two major components for the nation: the first is to develop a core set of indicators with which to monitor the general health of education in America including data gathered on state representative samples; the second is to encourage and stimulate each state to develop and collect data for a set of indicators that is valid for its own unique population and situation.

A. How do indicators get chosen?

The preceding discussion has suggested criteria for inclusion of an educational indicator either at the federal or at the state level. Remembering that one desideratum is parsimony, the key criteria seem to be:

1). The indicator should fit into a model of the educational system. Outcome indicators should reflect some general consensus of the desired outcomes of the elementary/secondary educational system. Input indicators, which we will divide into three parts below, should bear a clear and demonstrable relationship to one or more of the outcomes.

2). The only exception to criterion one would be for a variable that is politically useful (for example as an indicator of public commitment) but has not been found to be causally related to educational outcomes. Some would argue that per-pupil expenditure is such an indicator.

3). A third criterion would be the usefulness of the indicator in interpreting and understanding the consequences of changes in policy. The audiences for the proposed educational indicators include the federal government, the Chief State School Officers and local school officials. The set of indicators will need to be sensitive to alterations in policy such as increased graduation requirements, changes in the pay of teachers, increases or decreases in the resources available for the handicapped, bilingual and poor, or the increases in the length of the school day or year.

4). A final, apparently obvious, criterion is that the indicator should be arguably measurable. We say "apparently" because we often imagine we know how to do things when we don't. For example, opinion is divided on whether we can measure "higher order skills" and self-concept. Few would argue, however, that we can capture the characteristic called "teacher quality." This is not to say that we shouldn't include proxies for these variables in our set of indicators if they meet the other criteria—it is to say that we need a lot more effort directed at developing ways of measuring things we believe to be important.

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B. Toward Specification of a Model.

There are a variety of ways to think about the development of a set of educational indicators. One strategy, which we advocated earlier, is to reach consensus first on the outcome variables and then to focus on input variables. A second, independent strategy is to focus on variables that describe the educational system at a particular level of analysis (the classroom, school, system, or state). Our advice is to focus on the student as the key unit of analysis, in particular to meet criterion 3 above regarding relevance to changes in policy at the district, state and federal levels. The task will be to measure variables at the level of the student and then to aggregate them to a higher level—the school, district, state, region or nation—where they become a useful indicator for policy purposes.

The suggestions below follow both of these strategies. In addition, we divide the "input" indicator category into three parts (school characteristics, school processes, and policy and environmental indicators). Finally, our suggestions are made without the constraint of having to specify the source of the indicator.

1). Outcomes: Here we suggest five sets of indicators.

a). Student achievement: Basic and higher order skills including achievement in math, science, history, English and writing.

b). Student attainment: graduation rate and GED rate.

c). Post-secondary experiences: Youth employment and labor participation rates, college attendance rates for 2 and 4 year colleges, college graduation rates for elementary/secondary students and adult employment rates for graduates of the elementary/secondary system.

d). Student satisfaction and engagement in school.

e). Citizenship: Voting records and participation in civic activities of graduates of the elementary/secondary system.

2). School Characteristics: Six sets of indicators are suggested. Each is demonstrably related to one or more of the outcomes listed above or is a measure of societal commitment to education.

a). Teacher quality: An objective measure of verbal skills or of academic achievement; state certification in school content areas as a first approximation of pedagogical competence.

b). Quality of curriculum: Judgment by content experts; measures of "opportunity to learn" as percentage of items covered on outcome measure in content areas.

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c). Level of resources: Class size and per-pupil expenditure.

d). School climate: Teacher attendance, staff satisfaction and engagement in work, level of crime and violence in the school, and quality of management and administration in the school.

e). Equality of treatment: Quality and availability of resources for students with special needs; access to all students of different options and courses within schools.

f). Range of course offerings: Are, for example, students offered advance mathematics and science courses at this school.

3). School Processes: These indicators assess the way that the staff and students behave in the schools: there are six sets of indicators.

a). Time spent in instructional activities, in classrooms and at home on homework.

b). Attendance of students to school and classes.

c). Instructional strategies: Use of strategies that are apparently more effective than others such as active instruction, cooperative instruction and peer tutoring.

d). Participation by students in extracurricular activities.

e). Participation in various curricula of the high school; percent in academic, general and vocational curricula.

f). Participation by students in advanced courses such as calculus, advanced placement English, etc.

4). Environmental Indicators: There are three sets of these indicators.

a). Student characteristics including the percentage of minority, poor, and limited English speaking.

b). Climate of opinion regarding education including public voting on bond issues and attitudes toward the quality of education.

c). Policy environment: This would include indicators of recent changes in regulations and requirements made by state and local education agencies.

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IV. Phase III: The Evolution of Indicators

Once a core set of national indicators is established, there are a variety of other steps that need to be taken. One set of activities will be needed to continually refine and improve the existing indicators relying on new knowledge and measurement techniques. A second activity would involve working with states to aid them in developing their own unique set of indicators. A third activity might be to initiate special efforts to assess the health of the handicapped, bilingual and compensatory education subsystems.

Other steps may be taken to extend the scope of the set of indicators. Chief among the efforts needed here is the incorporation of data assessing differences among nations in the quality of education. A natural vehicle (the IEA) exists for this purpose. The interest by the U.S. federal government in this area has been desultory at best--a fact which has lowered the usefulness of the IEA data. This situation could be remedied.

One consequence of these needs is that there should be resources at the federal level dedicated each year to the maintenance and improvement of the set of educational indicators. Federal and state concern for educational indicators cannot fluctuate with the public concern about the quality of the educational system.

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